2011 Annual Report

Water & Wastewater Treatment Branch

City of Saskatoon

The Water Treatment Plant is responsible for the operation and maintenance of the City's water treatment plant, raw water intake and three potable water storage reservoirs. Infrastructure Services, Public Works Branch, is responsible for the operation and maintenance of the water distribution system. The Water and Wastewater Treatment Branch and the Public Works Branch work in unison to supply all consumers with safe and reliable high quality potable water at an acceptable pressure.

Aerial view of Water Treatment Plant and Meter Shop – Avenue H South

Aerial view of Wastewater Treatment Plant – Whiteswan Drive

The Wastewater Treatment Plant is responsible for the operation and maintenance of the City's wastewater treatment plant, 27 remote pumping facilities and the biosolids facility where solids, resulting from the treatment process, are handled and disposed. Infrastructure Services, Public Works Branch, is responsible for the operation and maintenance of the wastewater collection system. Wastewater is delivered to the plant by an extensive network of pump stations and underground pipes, treated to produce a high quality effluent and returned back to the South Saskatchewan River.

The Water and Wastewater Treatment Plants are designated Level 4 facilities, the highest level of certification in Canada. The treatment of water and wastewater is regulated by rigid provincial and national standards outlined in the Permit to Operate by the Saskatchewan Ministry of Environment.

The Meter Shop is responsible for the purchase, installation, testing, repair and replacement of water meters, and the installation and termination of water services. The Meter Shop is also responsible for the Cross Connection Control Program initiated in 2003. This program exists to ensure that proper backflow prevention devices are installed on institutional, commercial and industrial service connections and tested annually to protect the potable water in the distribution system from becoming contaminated by the process within these properties.

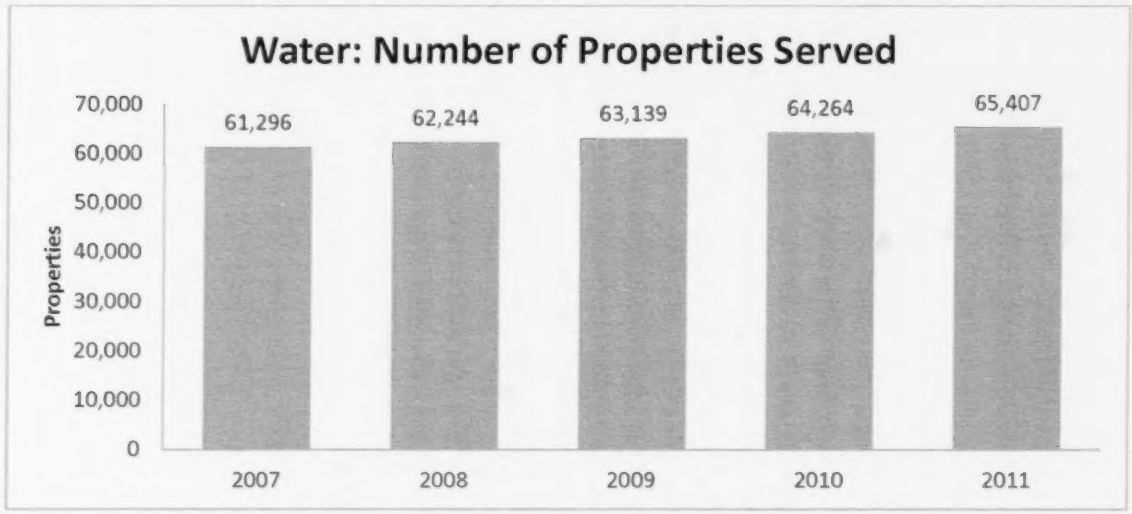
All customer billing, meter reading, and collections services are the responsibility of the Corporate Services Department.

OUR CUSTOMER

Customers Served

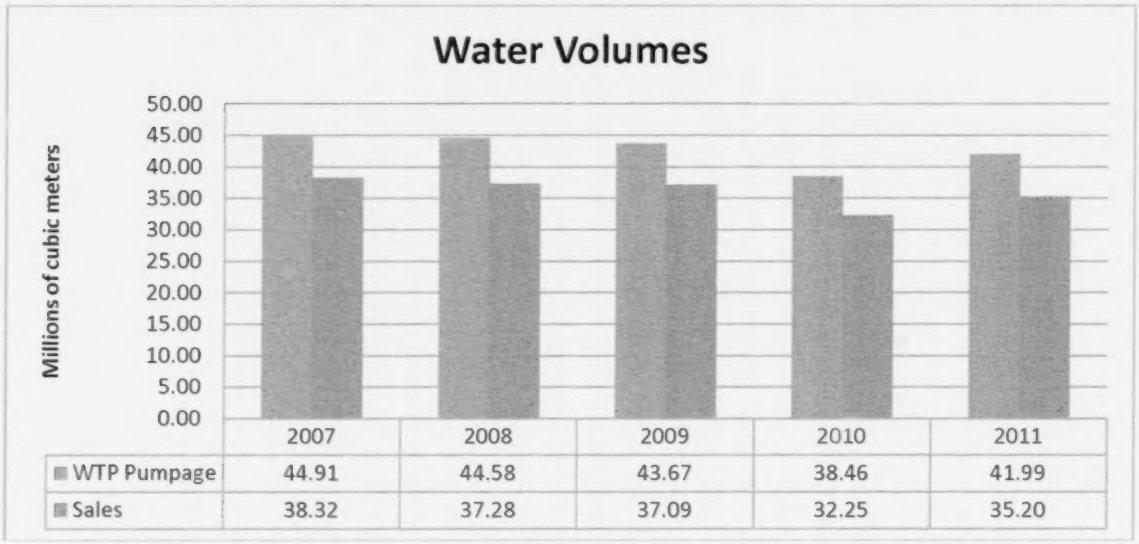
Customers include residential households, commercial and industrial businesses, and institutions within the city. The City of Saskatoon also sells potable water to SaskWater. They receive this water at seven supply points around the perimeter of the city and re-distribute to 22,792 consumers outside of Saskatoon.

The number of water meters in service is an accurate representation of the number of properties served as 100% of customers are metered. The approximate number of properties served in 2011 was 65,407, consisting of 60,055 residential households and 5,352 multi-unit dwellings (greater than 4 units), industrial, commercial, and institutional properties. This represents an increase of 6.7% in the last five years. Water treatment and distribution and wastewater collection and treatment are provided to all 234,200 citizens of Saskatoon.



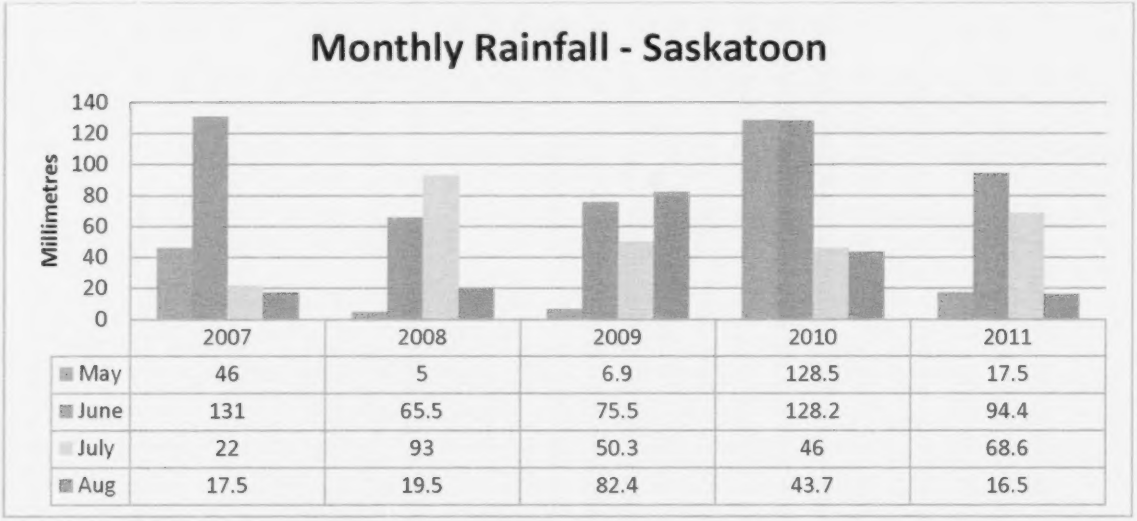
Based on customer meter readings, the volume of water sold to all customers in 2011 was 35.2 million cubic metres. This is a 4.2% drop in volume from the previous five-year average volume of 36.7 million cubic metres. The decline in 2011 water volumes is partly due to the water restriction that was required after experiencing capacity challenges at the Water Treatment Plant, and also due to higher than normal rainfall in June and July which resulted in a reduction in residential and commercial irrigation.

The following chart shows both water volume sales and water treatment pumpage. Water Treatment Plant (WTP) pumpage measures the volume of treated water pumped from the Water Treatment Plant into the distribution system. The difference in values is due to water loss (e.g. leaking water main joints), unmetered use (e.g. flushing water mains, fire flow), and estimated consumption and year end unbilled volumes.

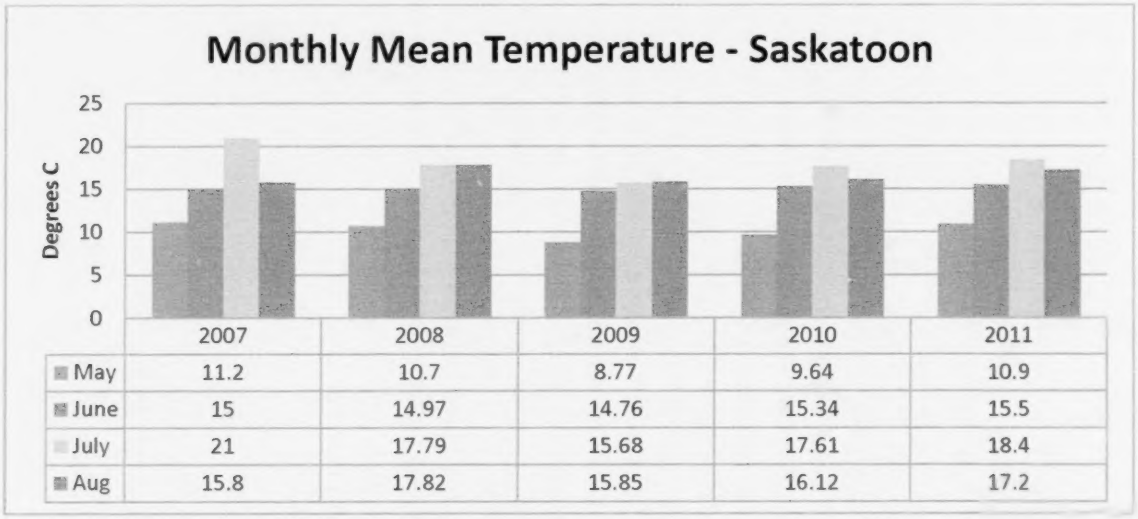


	2007	2008	2009	2010	2011
WTP Pumpage	44.91	44.58	43.67	38.46	41.99
Sales	38.32	37.28	37.09	32.25	35.20

Variations in annual water sales correlate closely with summer rainfall and temperatures which show irrigation is a significant portion of total sales volume.

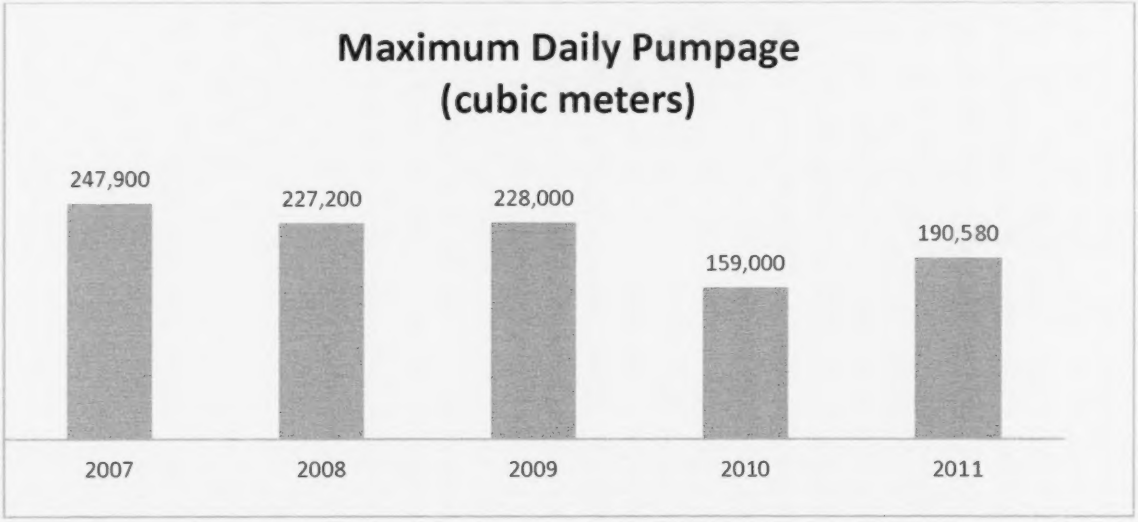


	2007	2008	2009	2010	2011
May	46	5	6.9	128.5	17.5
June	131	65.5	75.5	128.2	94.4
July	22	93	50.3	46	68.6
Aug	17.5	19.5	82.4	43.7	16.5

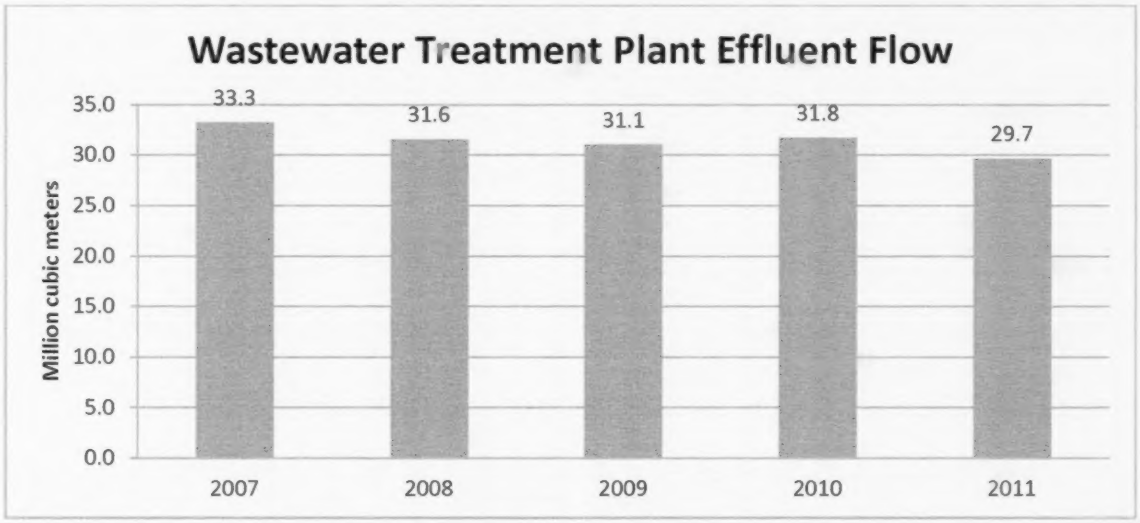


	2007	2008	2009	2010	2011
May	11.2	10.7	8.77	9.64	10.9
June	15	14.97	14.76	15.34	15.5
July	21	17.79	15.68	17.61	18.4
Aug	15.8	17.82	15.85	16.12	17.2

A maximum daily pumpage of 190,580 m^3 (191 million litres per day) occurred in September of 2011. The following chart shows that maximum daily pumpage in 2011 is 18% less than the 2007 to 2009 average maximum pumpage due to higher than average rainfall and cooler temperatures.



Wastewater Treatment Plant (WWTP) flows increase in wet weather conditions due to inflow (e.g. weeping tiles) and infiltration (e.g. leaky pipe joints and manholes) into the wastewater collection system. One primary sedimentation basin was taken out of service to provide additional surcharge capacity during high flow events and emergencies. Using the empty basin to store excess flow reduced unintentional untreated wastewater discharge into the river. Infrastructure Services have designed and installed various infrastructure to attenuate the inflow and infiltration into the collection system. Although summer peak flows have been higher in 2010 and 2011, the total effluent volumes discharged to the river have trended downward slightly. This can be attributed to lower residential indoor water consumption.



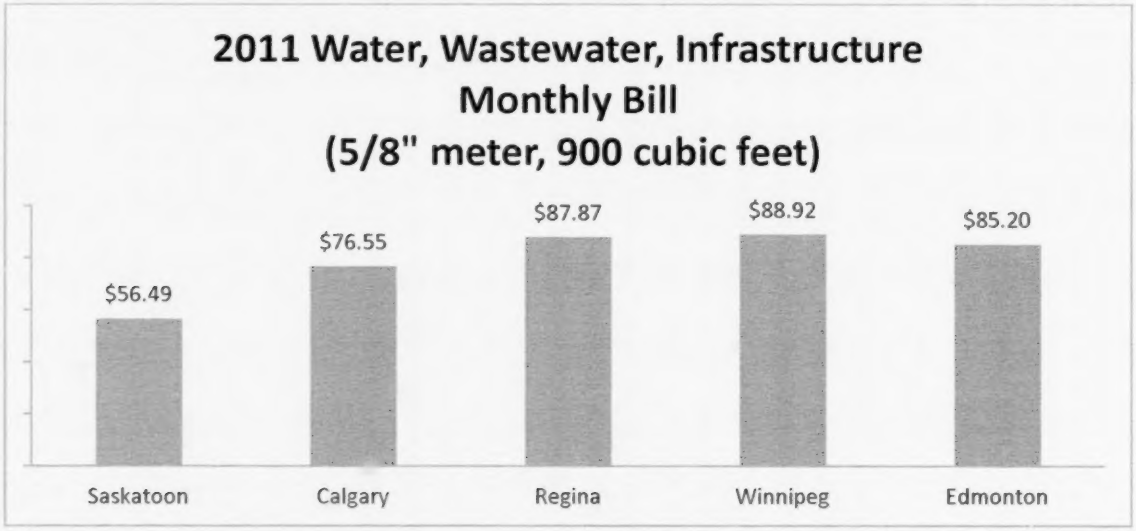
In 2011, the Meter Shop undertook 1,564 new meter installations, changed 1,432 meters as part of the replacement program, and made 12,490 service calls. Service calls result from work orders, generated by Corporate Services, to check malfunctioning meters, or if a cut-off/reconnect has been ordered.

	2007	2008	2009	2010	2011
new installation	907	1,227	971	1,380	1,564
Change out	1,401	997	1,733	1,216	1,432
Service Calls	12,311	9,122	12,041	10,654	12,490

Presently, there are 4,475 active backflow prevention devices. In 2011, 637 new devices were installed and 95.6% of all devices were tested, which is up from 95.4% in 2010. Of the 4.4% not tested, almost all of these water connections were inactive in 2011 due to construction.

Comparisons

The following chart compares monthly water, wastewater, and infrastructure bills for residential customers. Saskatoon bills remain significantly less than other prairie cities in Alberta, Manitoba and Saskatchewan. For example, assuming a 5/8" meter connection and a monthly volume of 900 ft^3, Calgary bills are 35% more and Regina bills are 56% more than Saskatoon.



Customer Satisfaction

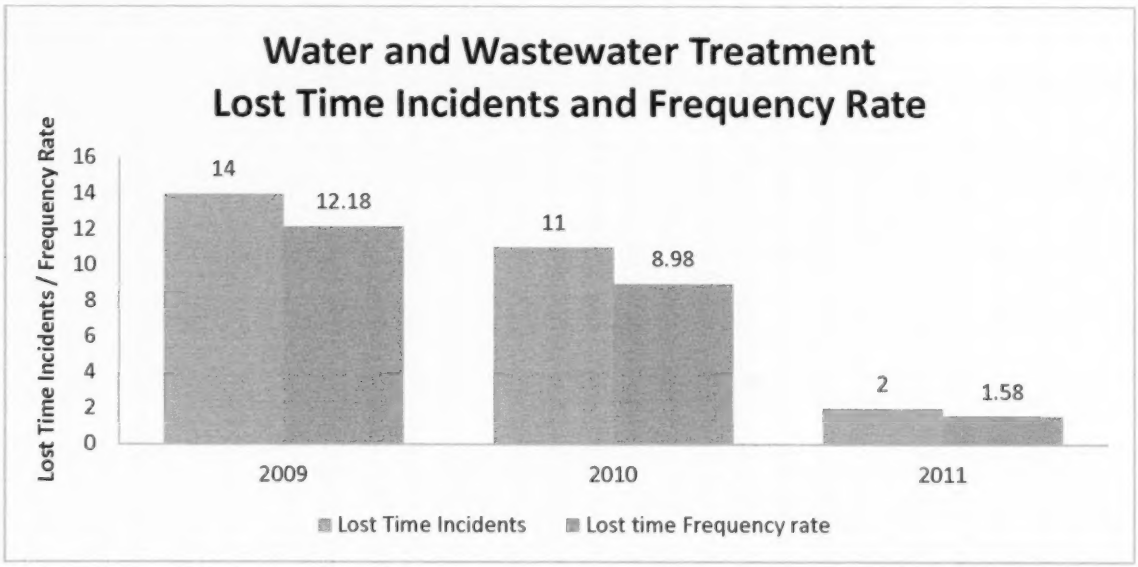
In the City of Saskatoon 2011 Civic Services Satisfaction Study, Saskatoon citizens ranked water treatment and wastewater treatment as two of the most important civic services. A score of 10 means "excellent" and 5 means "average". In 2011, citizens indicated a satisfaction level of 8.4 for water quality and 7.5 for sewage treatment. Scores exceeding 7.5 are considered to be good. Water quality has consistently received the highest score and sewage treatment has consistently scored in the top four of all services provided by the City.

OUR PEOPLE

Employee Safety

The Water Treatment Plant and the Meter Shop employs 70.7 full time employees (FTEs); the Wastewater Treatment Plant employs 53.0 FTEs. Utility management and staff have placed a strong emphasis on safety in the workplace by holding safety meetings, "tool box" meetings, work observations, and work planning. The Utility achieved the number of safety meetings planned for the year and undertook 96 work observations.

In 2011, the Utility experienced 2 lost-time incidents for a total of 137 lost-time days. Both these measures are an improvement from 2010. As a result, both the lost-time frequency rate (1.58) and severity rate (108.06) improved from 2010. The Utility achieved this reduction by working together with the Occupational Health and Safety Committee, staff and management to keep safety # 1 in everything we do.

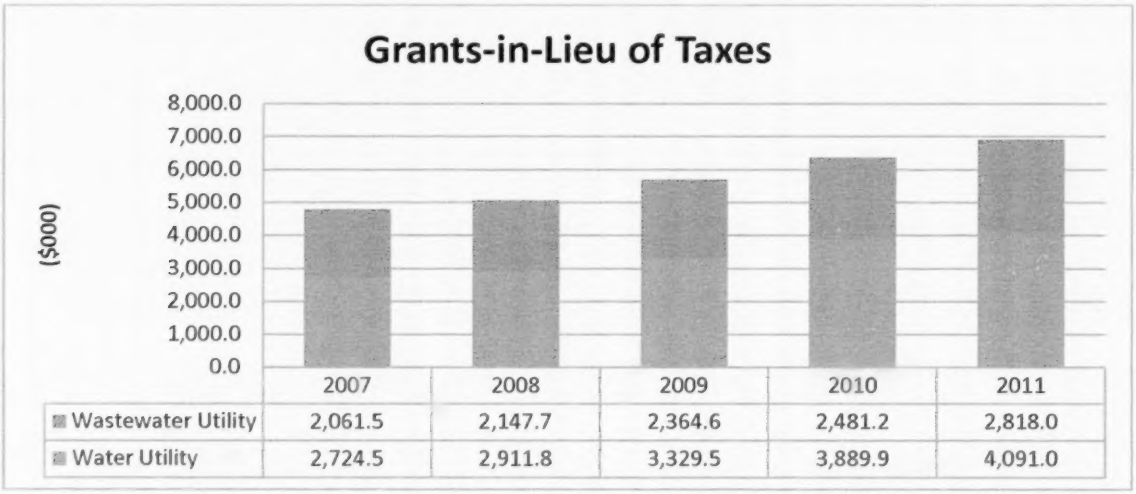


OUR FINANCES

Revenues Contributed to the City of Saskatoon

The Water and Wastewater Utility provides the City of Saskatoon with a grants-in-lieu of taxes. City policy states that the grants-in-lieu of taxes will equal 10% of budgeted metered revenue excluding revenue designated for transfer to the water treatment capital reserve and wastewater treatment capital reserve.

In 2011, the Water and Wastewater Utilities transferred $6,909,000 to the City; $4,091,000 from the Water Utility and $2,818,000 from the Wastewater Utility.



	2007	2008	2009	2010	2011
Wastewater Utility	2,061.5	2,147.7	2,364.6	2,481.2	2,818.0
Water Utility	2,724.5	2,911.8	3,329.5	3,889.9	4,091.0

Revenues

The Water and Wastewater Utilities are fully funded through their rates. In 2009, Council approved average annual rate increases of 7.5% for each of the years 2010, 2011, and 2012 based on an administrative recommendation.

The financials include water distribution and wastewater collection programs which are the responsibility of Infrastructure Services. The Infrastructure Services Department's operating costs cover the operation and maintenance of the water distribution system and wastewater collection system. This includes emergency work to repair watermain and service connection breaks, sewer failures, and to clean and clear sewer main blockages.

The infrastructure levy is used to fund Infrastructure Services water distribution and wastewater collection system capital rehabilitation and replacement projects needed to address aging infrastructure, including elimination of the watermain replacement backlog to meet current service levels.

In late spring and early summer 2011, high river levels carrying extra silt and sand caused capacity challenges at the Water Treatment Plant which lead to a four week, mandatory water restriction.

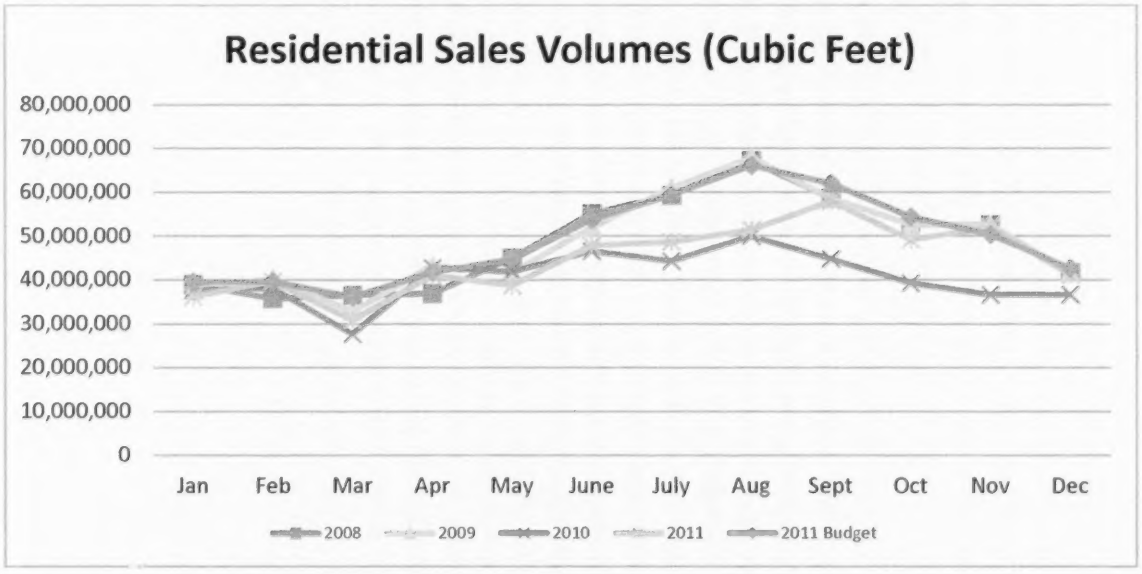
The restriction resulted in lower than forecasted water volumes, and water and wastewater revenue that was $2,541,000 less than budget.

This revenue shortage was offset by deferring maintenance and capital work, that was reasonable to delay, reducing operating costs and deferring debt reduction payments. Expenditures were reduced by $2,991,000, which left a combined water and wastewater surplus of $450,000.

Water Utility Revenue

Total water revenue in 2011 was $45,772,000 which is $1,809,000 (3.8%) less than budget.

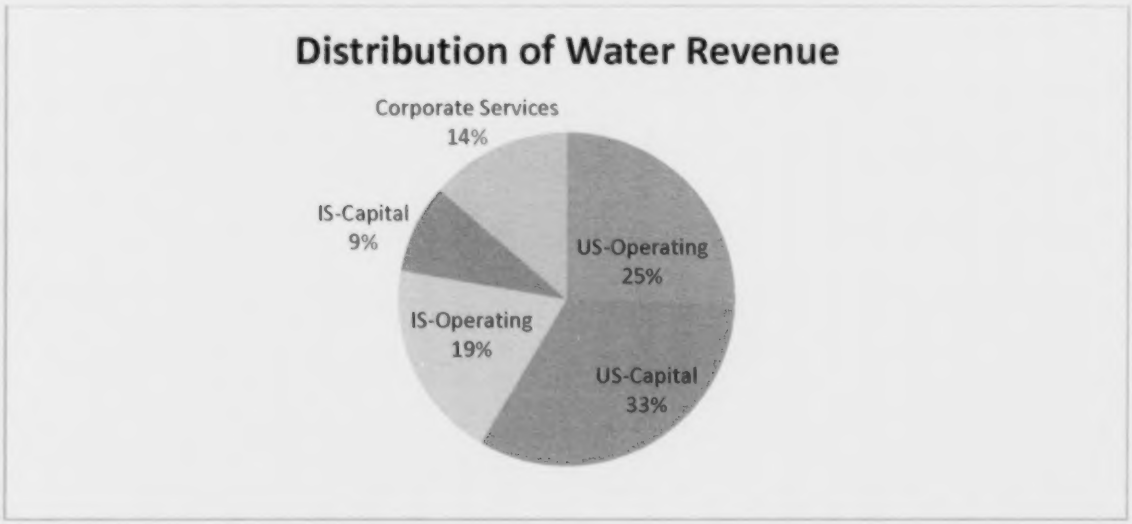
Metered revenue was $40,859,000 which is $1,652,000 (3.9%) less than budget. The unfavourable revenue variance is due to the sales volume, which was 6.6% less than budget. Approximately 71% of metered revenue is from volumetric charges and the remaining 29% from fixed charges. Revenue from the sale of water consists of sales to residential customers (49% of total) and industrial/commercial/institutional customers (51% of total). The following chart shows how the normal summer residential sales did not occur in 2011.



Infrastructure levy revenue is a volumetric charge that funds the Infrastructure Services capital reserve. This revenue was $202,000 (4.8%) less than budget due to the lower than budget volumes.

Other revenue, which consists of the fire protection charge, late payment penalties and some miscellaneous revenue, was slightly more than budgeted.

The following chart shows how the Water Utility revenue is distributed among Utility Services (US), Corporate Services, Infrastructure Services (IS), and General Revenues (as Grant-in-Lieu). US-Operating costs include treatment, pumping, storage, meter shop, administration, and general. US-Capital costs fund all capital work related to the treatment plant and reservoirs. The Corporate Services portion includes grants-in-lieu of taxes, cross charges for customer billing and collections, and corporate administration. IS-Operating includes the operating costs for the distribution system, and IS-Capital funds Infrastructure Services capital reserve to fund capital projects.



The total 2011 non-capital related operating cost to supply potable water to 256,992 consumers (Saskatoon and SaskWater) was $26,988,000 or $105.01 per capita. The total 2011 capital related operating cost was $19,184,000 or $74.64 per capita.

2011 Water Utility Operating Budget Variance ($000)

	Budget	Actual	Variance	%
Metered revenue	$42,511	$40,859	($1,652)	-3.89%
Infrastructure Levy	4,185	3,983	(202)	-4.83%
Other revenue	885	930	46	5.14%
Total revenue	$47,581	$45,772	($1,809)	-3.80%
Expenses:				
US -Treatment, Pumping Storage	$9,173	$8,943	($230)	-2.51%
US-Meters	1,283	1,328	45	3.51%
US-Admin & general	2,064	1,517	(547)	-26.49%
US-Capital charges	15,293	15,201	(93)	-0.60%
City Hall Services	2,330	2,200	(130)	-5.56%
Grants-in-lieu of taxes	4,091	4,091	0	0.00%
IS-Distribution	9,162	8,909	(253)	-2.76%
IS-Provision to Capital	4,185	3,983	(202)	-4.83%
Total expense	$47,581	$46,172	($1,409)	-2.96%
Revenue less expense	($0)	($400)	($400)	
(To)/From Stabilization reserve	0	$400		
Return on Investment	($0)	($0)	$0	0.00%

Wastewater Utility Revenue

Total wastewater revenue in 2011 was $38,751,000 which is $732,000 (1.9%) less than budget.

Metered revenue was $28,453,000 which is $1,202,000 (4.1%) less than budget. Wastewater metered revenue is billed based on water volumes. The unfavourable revenue variance is due to the water sales volume which was 6.6% less than budget. Approximately 58% of metered revenue is from volumetric charges and the remaining 42% is from fixed charges. Metered revenue consists of sales to residential customers (48% of total) and industrial/commercial/institutional customers (52% of total).

Infrastructure levy revenue is a volumetric charge that is transferred to Infrastructure Services capital reserve. This revenue is $279,000 (4.8%) less than budget due to the lower than budget volumes.

Other revenue, which consists of liquid waste hauler fees, late payment penalties, and some miscellaneous revenue, was $513,000 (68.5%) more than budget.

Flood protection levy revenue is a fixed charge that is transferred to Infrastructure Services capital reserve. This revenue is $236,000 (7.2%) more than budget due to a higher than budgeted number of meters.

The following chart shows how the Wastewater Utility revenue is distributed among Utility Services (US), Infrastructure Services (IS), and Corporate Services. US-Operating costs include treatment, lift stations, sludge handling and disposal, and administration. US-Capital funds all wastewater plant and lift station capital works. Corporate Services portion includes grants-in-lieu of taxes, cross charges for customer billing and collections, and corporate administration. IS-Operating funds operating costs for the sanitary sewer collection system, and IS-Capital is the infrastructure levy revenue and flood protection levy that are transferred to the Infrastructure Services capital reserve to fund capital projects.

The total 2011 non-capital related operating cost to treat the city's wastewater was $19,901,000 or $84.97 per capita. The total 2011 capital related operating cost was $18,000,000 or $76.86 per capita.

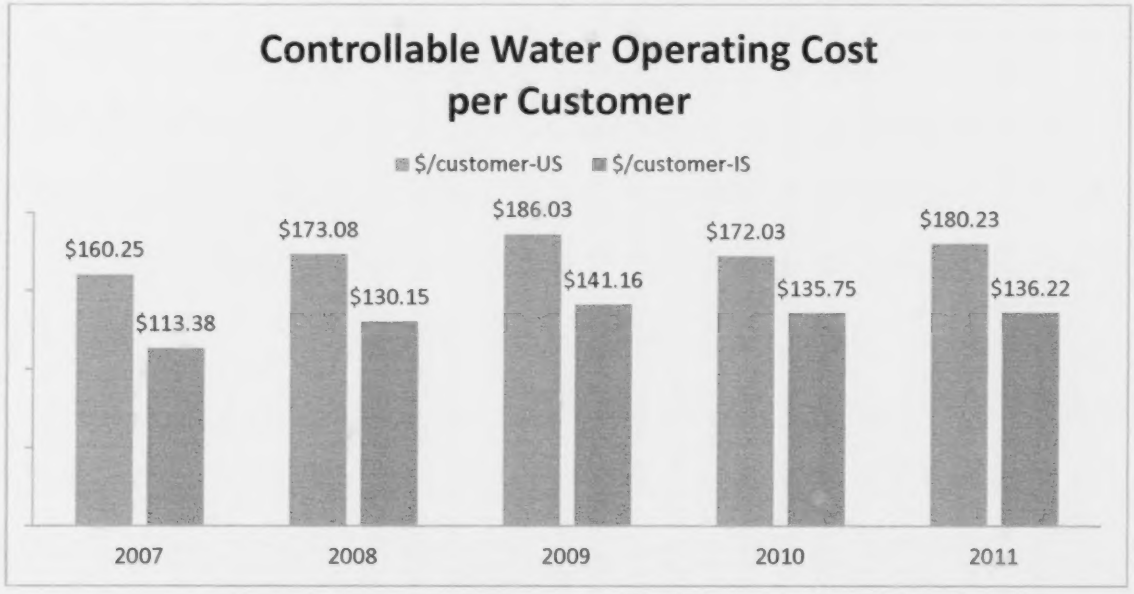
2011 Wastewater Utility Operating Budget Variance ($000)

	Budget	Actual	Variance	%
Metered revenue	$29,655	$28,453	($1,202)	-4.05%
Infrastructure Levy	5,779	5,500	(279)	-4.83%
Other revenue	749	1,262	513	68.45%
Flood Protection Levy	3,300	3,536	236	7.16%
Total revenue	$39,483	$38,751	($732)	-1.85%
Expenses:				
US -Treatment	$6,784	$6,484	($300)	-4.42%
US-Lift Stations	1,114	1,439	326	29.24%
US-Sludge Handling & disposal	1,627	1,441	(186)	-11.43%
US-Admin & general	952	679	(273)	-28.66%
US-Capital charges	9,057	8,964	(93)	-1.02%
City Hall Services	1,644	1,542	(103)	-6.24%
Grants-in-lieu of taxes	2,818	2,818	0	0.00%
IS-Collection	6,408	5,497	(911)	-14.22%
IS-Provision to Capital	9,079	9,036	(43)	-0.47%
Total expense	$39,483	$37,901	($1,582)	-4.01%
Revenue less expense	$0	$850	$850	
(To)/From Stabilization reserve	0	($850)		
Return on Investment	$0	$0	$0	0.00%

Key Performance Indicators

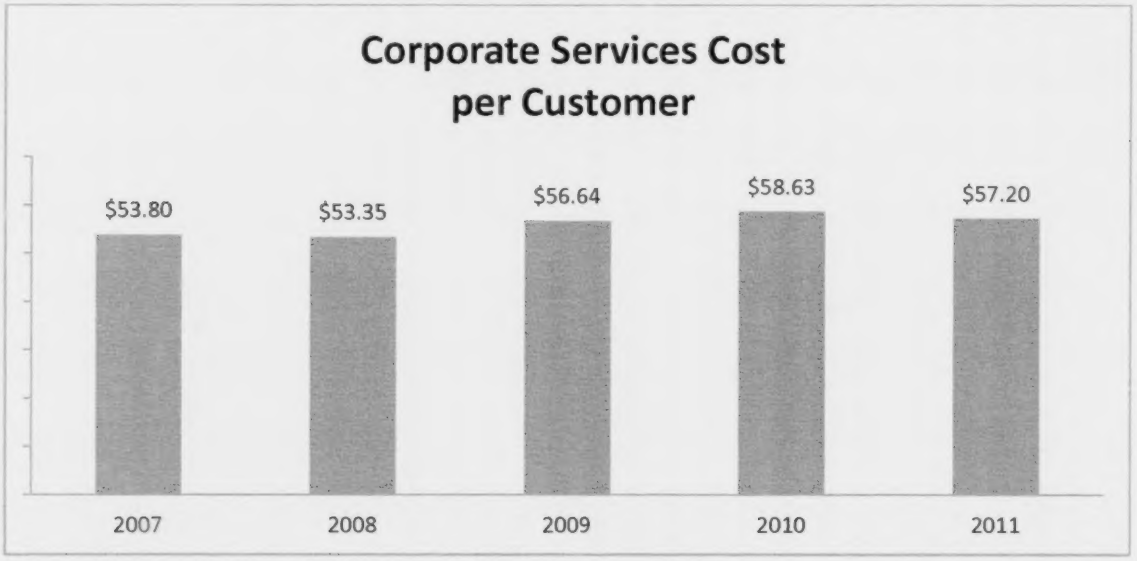
Unmetered water is determined as the difference between the amount of treated water pumped from the Water Treatment Plant and the amount metered at customer premises. This difference is due to water loss through leaks or unauthorized water use, authorized but unmetered consumption, and estimated consumption and year-end unbilled volumes. Over the past five years, this difference has ranged from 15 to 17% of pumpage volumes. For a given level of sales consumption, any improvement in water loss would result in lower water volume treated and lower water treatment operating costs. Reduction of water loss will require maintenance and investment in the water distribution system.

Utility Services controllable water operating costs include treatment, pumping, storage, meter shop, administration, and general. Controllable operating costs exclude the cost of Corporate Services, debt servicing costs, and provisions to capital reserves. Infrastructure Services operating costs include the operating costs for the distribution system. Faced with a large unfavourable revenue variance, management was able to reduce controllable water costs per customer from 2009, due in part to lower chemical and electricity costs resulting from reduced volume treated and pumped. The average increase in this metric over the five-year period was 3.0% for Utility Services and 4.7% for Infrastructure Services.



Utility Services controllable wastewater operating costs include treatment, lift stations, sludge handling and disposal, administration, and general. Infrastructure Services wastewater operating costs include the operating costs for the wastewater collection system. The average increase in this metric over the five-year period was 1.7 and 10.3% per year respectively for Utility Services and Infrastructure Services.

Corporate Services costs include customer billing and collections, administrative overhead, and computer services charges. The following chart shows the combined annual Corporate Services costs for water and wastewater. These costs per customer increased at a rate of 1.5% per year from $53.80 in 2007 to $57.2 in 2011.



OUR WORK

Since the North Battleford (Saskatchewan) and Walkerton (Ontario) water quality incidents, the provincial government Permit to Operate has required more stringent monitoring and reporting. Water chemists, technologists, and treatment plant operators conduct over 50,000 water treatment quality tests and a further 5,000 distribution water quality tests every year as part of the water quality control program. Saskatoon consistently meets or exceeds all regulatory limits for drinking water quality.

The public expects responsible watershed management and stewardship. The Utility is a member of South Saskatchewan Watershed Stewards Incorporated, a community based non-profit corporation that was formed to implement the South Saskatchewan River Watershed Source Water Protection Plan. Protecting the river and its surrounding watershed is vital to the long-term sustainability of our water supply.

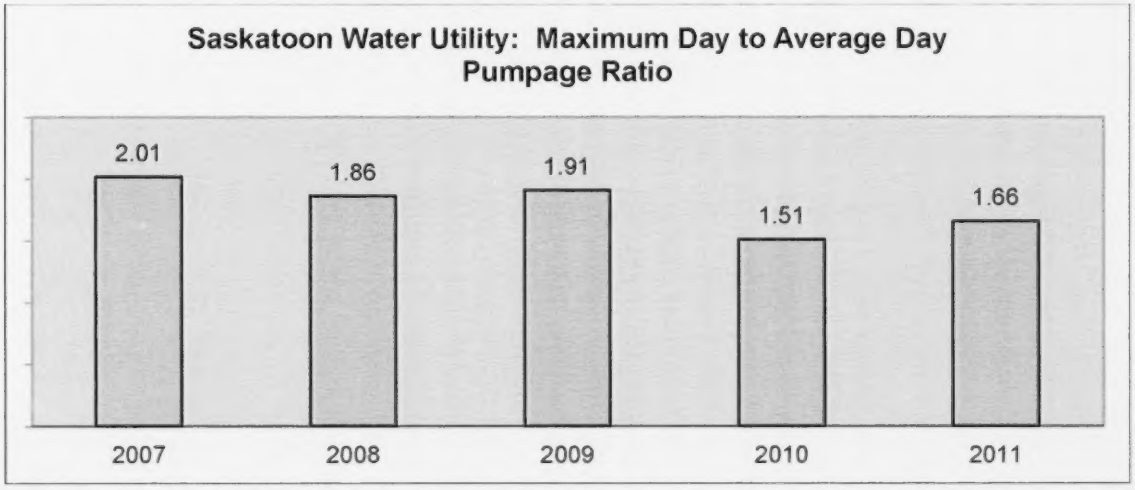
A Consumer Confidence Report is distributed each year by the end of May, and can be found on the City's website. The quality of final wastewater effluent produced in 2011 exceeded all of the Saskatchewan Ministry of Environment Permit to Operate limits. Phosphorous is the key nutrient the Wastewater Treatment Plant removes because of its negative impacts on the Saskatchewan River. The implementation of the ultraviolet disinfection facility to replace chlorine disinfection at the Wastewater Treatment Plant has improved the quality of the final effluent being discharged to the South Saskatchewan River.

Guided tours of both the Water Treatment and Wastewater Treatment Plants are available to the public to increase awareness of the operations of the utilities and the provision of safe reliable water as well as the production of quality effluent returned to the South Saskatchewan River.

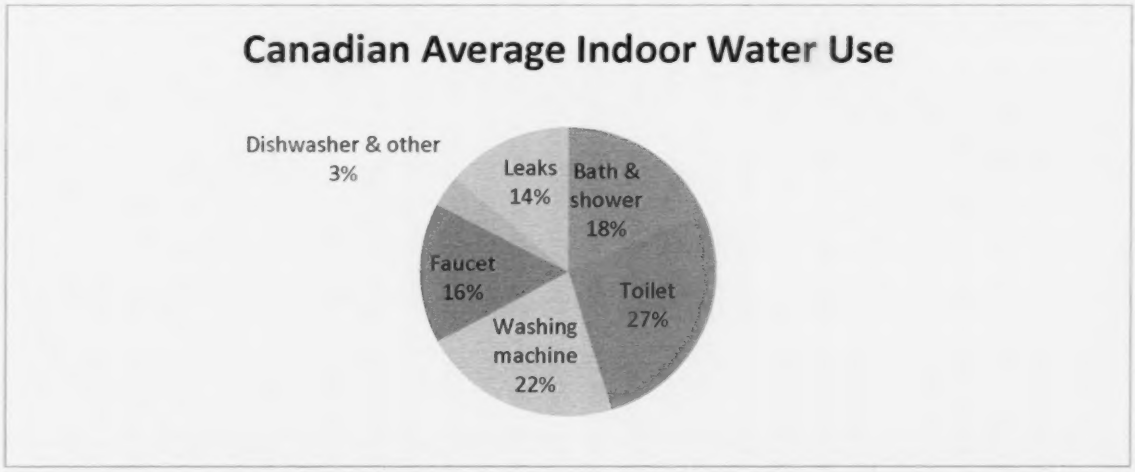
The Utility supports the Provincial Operator Certification Program, for both the Water and Wastewater Treatment Plants, which helps protect both the public and the environment.

Conservation

The 2009 Water Treatment Long Term Capital Development and Expansion Plan recommended the development of a water conservation plan to defer the need for a new water treatment plant, and other capital expenditures attributed to increased demand. The 2010-2012 rate plan implemented new conservation-oriented rates. In addition, customer education to attenuate the summer maximum day volume (peak demand management) will also defer some capital expenditures. In 2010, the maximum day pumpage was very low because of the virtual elimination of summer irrigation. As a result, the peaking ratio of maximum day to average day fell to 1.51. In 2011, the mandatory water restriction and wetter than normal months of June and July reduced the peaking ratio to 1.66. As conservation rates and customer education begin to impact customer behaviour, this ratio should fall from the 1.9 level experienced in 2009, however, it is not anticipated to reach as low as the 2010 level on a consistent basis.

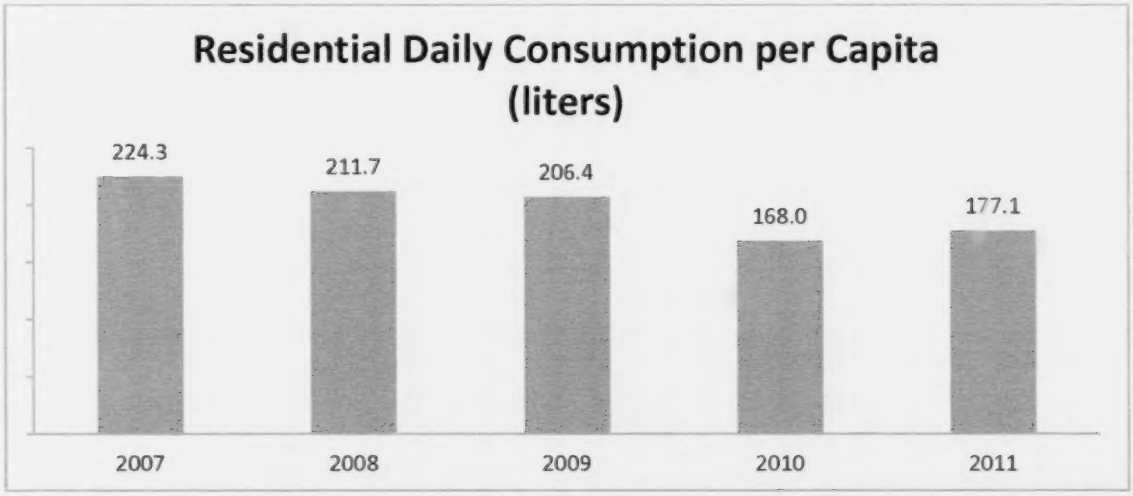


The following chart provides an indication how water is consumed in Canadian homes.



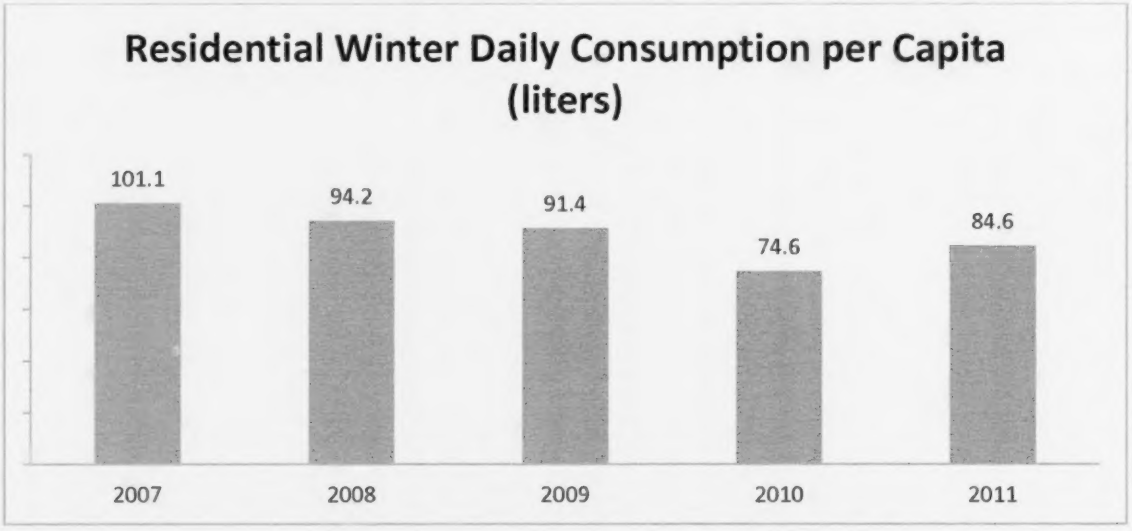
The above proportioning of indoor water use can vary significantly depending on whether low-flow toilets, showers and washing machines are used. Studies show that households with low-flow fixtures use approximately 36% less water for these functions than households without water efficient fixtures.

The following chart provides a measure of Saskatoon residential consumption on a per day per capita basis averaged over the entire year and, therefore, includes outdoor use.



There has been a downward trend for residential daily consumption per capita, however, due to fluctuating seasonal irrigation demands this value varies significantly from year to year. In 2010 and 2011, this metric is lower than usual due to the wet summers and the 2011 mandatory water restriction. By comparison, the most recent National Benchmarking initiative showed a median Canadian consumption of 210 litres per capita per day in 2010.

The following chart provides a measure of residential consumption on a per capita per day basis averaged over the months of January to March and October to December when outdoor water use is not a factor.



A comparison of residential sales during the winter months shows a steady decline in per capita daily indoor consumption of 3.11% per year since 2007 or a total decline of 16.3%. Studies from other municipalities confirm that this downward trend in indoor residential use has been occurring over the last decade. Although quite significant now, it is anticipated that this trend will flatten after most households are fitted with low-flow fixtures. The decline in indoor use accounts for 35% of the total decline in the daily per capita consumption when irrigation is considered.

Capital Projects in Progress

Aerial view of construction of new intake facility upstream of the Queen Elizabeth Power Station.

The Engineering Services Section provides project management services for capital expansion and asset replacement for the Branch. At 2011 year end, there were 18 active projects in the Water Treatment Section with total approved funding of $122 million of which $82 million remained to be spent. The new Water Intake Facility ($45 million) was in the commissioning stage and the Avenue H Reservoir Expansion, Ultraviolet Disinfection and High Lift Pumping ($42 million) was in the tendering stage.

The Wastewater Treatment Section had 27 active projects at year end with approved funding of $27 million of which $12 million remained to be spent. Significant projects included Standby Generation ($3.5 million), Lift Station Upgrades ($4.8 million), Primary Digester Upgrade ($4.6 million), Struvite Mitigation ($3.3 million), and Operations/Maintenance Facility Upgrade ($3.1 million).

2011 Water Restriction

Six weeks of extremely high river flows and an associated deterioration in river water quality compounded by a combination of mechanical and process interruptions significantly impacted the effectiveness of the water treatment process, resulting in four weeks of mandatory water restrictions. The situation required the coordination and intense commitment of maintenance and operations personnel to investigate and develop appropriate strategies to overcome the many factors that attributed to the process and equipment problems.

To ensure that future situations of this magnitude are minimized and more effective civic responses are provided, the following systems and strategies will be implemented:

1. Minimize the intake of sand and fine silt particles through the use of the new river intake and the strategies developed for the secondary intakes to minimize flow velocities.
2. Clarifier optimization through the operation of the new lime feed systems and the staged addition of tube settlers in all clarifiers will reduce the amount of fine particles in the treatment process.
3. Coordinate the start of all capital projects in early fall with the intention of project completion well in advance of summer water demands.
4. Instalment of a permanent PAC filter aid system to improve filter performance when fine particles are affecting their capacity.
5. Develop a well planned and consistent communication strategy to ensure all stakeholders are aware of the potential for a compromised water quality event and to understand the necessity and details surrounding water restrictions.

IN CONCLUSION

Through its approved 2011 Operating Budget and the approved Five Year Capital Plan including the 2011 Capital Budget, the Utility was able to maintain operations and fund capital projects related to treated water and wastewater quality, city growth, and regulatory matters.

The success of the Utility is dependent on the dedication and skills of its employees and their efforts are greatly appreciated. Our competent team of plant operators, tradespersons, maintenance staff, engineers, technologists, technicians, chemists, and administrators all play a crucial role. The guidance and support of the City Manager and City Council is appreciated.

The Utility and its staff look forward to the challenges and the opportunities that the future will provide.